Training costs for Junior Surface Warfare Officers

Makee, Michael D.

Monterey, California: Naval Postgraduate School

NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

TRAINING COSTS FOR JUNIOR SURFACE WARFARE OFFICERS

by

Michael D. Makee

March 1999

Thesis Advisor: Bill Gates
Co-Adviser Julie Filizetti

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	March 1999	Master's Thesis

4. TITLE AND SUBTITLE
TRAINING COSTS FOR JUNIOR SURFACE WARFARE OFFICERS

5. FUNDING NUMBERS

6. AUTHOR(S)
Makee, Michael D.

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Naval Postgraduate School
Monterey, CA 93943-5000

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES
The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT *(maximum 200 words)*

Current Surface Warfare Officer (SWO) retention is well below the level needed to staff Department Head billets in the Fleet. The Navy is developing a career incentive pay to stem the flow of SWOs leaving the Navy and increase retention. The purpose of this thesis is to capture the training costs of junior Surface Warfare Officers that occur between commissioning and qualifying as a SWO. This thesis also explains the economic theory of specific training and its relevance to the wage streams offered to SWOs. This thesis estimates the training cost of qualifying a SWO to be $80,194.

14. SUBJECT TERMS	15. NUMBER OF PAGES
Surface Warfare Officer, Training, Retention, Cost	58
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

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TRAINING COSTS FOR JUNIOR SURFACE WARFARE OFFICERS

Michael D. Makee
Lieutenant, United States Navy
B.S., United States Naval Academy, 1992

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
March 1999

Author: [redacted]
Michael D. Makee

Approved by: [redacted]
Bill Gates, Thesis Advisor

[redacted]
Julie Filizetti, Co-Adviser

[redacted]
Reuben T. Harris, Chairman
Department of Systems Management

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ABSTRACT

Current Surface Warfare Officer (SWO) retention is well below the level needed to staff Department Head billets in the Fleet. The Navy is developing a career incentive pay to stem the flow of SWOs leaving the Navy and to increase retention. This thesis utilizes the training costs of individual 116X officers and aggregates them to produce a weighted average cost of SWO training of $80,194. This thesis uses the training cost estimates to compare the Navy's pay policies with those from economic theory. Recommendations are offered for the structure of the SWO incentive pays.

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LIST OF ACRONYMS

BST	Basic Skills Training
CHAMPUS	Civilian Health and Medical Program of the Uniformed Services
COMET	Cost of Manpower Estimating Tool
FYDP	Future Years Defense Program
MPN	Military Personnel, Navy
NPC	Naval Personnel Command
NCCA	Naval Center for Cost Analysis
NETPDTC	Naval Education and Training Professional Development and Technology Center
NROTC	Naval Reserve Officer Training Corps
OCS	Officer Candidate School
O&MN	Operation and Maintenance, Navy
PCS	Permanent Change of Station
PQS	Professional Qualification Standards
SWO	Surface Warfare Officer
SWOS	Surface Warfare Officer School
SWOSDOC	Surface Warfare Officer Division Officer Course
USNA	United States Naval Academy

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I. INTRODUCTION

A. PURPOSE

This thesis estimates the Navy's cost to train a junior Surface Warfare Officer (SWO). It identifies typical training pipelines for junior officers from commissioning through designation as a qualified SWO and estimates the costs of each step in the pipeline. Efforts were made to capture all direct and indirect training costs and variations in training pipelines due to specific needs of both ship type and billet are addressed.

This thesis also discusses the labor economic theory of firm-specific training and discusses whether the Navy engages in such training and adheres to the associated wage structures. This thesis then discusses how specific training wage streams could be used by policy planners to create SWO incentives to improve retention.

B. RESEARCH QUESTIONS

Primary

1. How much does it cost the Navy to produce a SWO?

Secondary

1. Does it appear that the Navy uses the economic theory of specific training in determining wages and incentives for SWOs?
2. How can SWO cost estimates be used by policy makers to increase retention?

C. SCOPE, LIMITATIONS, AND ASSUMPTIONS

This thesis analyzes costs incurred by the Navy while training a newly commissioned officer to become a SWO. Cost estimates include permanent change of station (PCS), formal school training, and shipboard training costs. Variations in formal

school training costs resulting from billet and ship specific requirements are accounted for by calculation of a weighted average.

A typical training pipeline for junior Surface Warfare Officers is used. This thesis defines a typical SWO training pipeline as a junior officer reporting to Surface Warfare Officer School immediately upon commissioning, completing required schools, reporting to his first ship, and beginning SWO qualifications. This thesis assumes that all watches stood by nonqualified officers are in essence SWO training.

PCS costs are capture by using the Military Composite Standard Pay and Reimbursement Rates. Naval Education and Training Professional Development and Technology Center (NETPDTC) reports account for formal schoolhouse training costs. Shipboard training costs are estimated by a percentage of annual pay earned while standing watch. These costs are derived from operational tempos and Standard Navy Workweeks.

The thesis only addresses the training costs associated with obtaining the Surface Warfare Officer qualification. Training costs for other qualifications earned by junior SWOs, such as Engineering Officer of the Watch are discussed, but are beyond the scope of this thesis.

D. BENEFITS OF THIS STUDY

This thesis develops a weighted-average cost that represents the training expenses incurred by the Navy while qualifying a SWO and can be considered as the training "price tag" of a qualified SWO. This number will be useful in future cost/benefit analyses of retention incentives. It will aid in establishing appropriate wages to

compensate for specific training. Proper compensation should have positive affects on retention.

F. ORGANIZATION OF THE THESIS

Chapter II describes the economic theory of firm-specific training. Chapter III reviews the COMET model's costing techniques for SWOs and its applicability to the surface community. Chapter IV explains the methodology used in determining training costs for junior SWOs and presents the results. Chapter V discusses the conclusions of the study and offers suggestions for further study.

II. FIRM-SPECIFIC TRAINING

A. DEFINITION

Specific training is any instruction that increases an individual's productivity *only* at the firm in which he or she is currently working. This differs from general training, which improves productivity to many employers. Examples of specific training would include teaching an employee how to operate machinery unique to the firm or explaining the firm's organizational structure. Pure specific training is difficult to identify because most training is a combination of specific and general. However, highly specialized firms rely heavily on specific training to increase worker productivity and maximize profits.

B. MARGINAL PRODUCTIVITY

Marginal productivity (MP) is the amount of extra work or products that the employee can produce in a given amount of time. Marginal productivity determines the worth of an employee to a firm. If an employee has general skills and is hired in an open labor market, then the expected wage (W*) of that employee would be equal to their marginal productivity (W* = MP*). This is true because the general skills of the employee can be used at any firm, so employers must pay a competitive wage equal to the marginal productivity of the employee or they will seek employment elsewhere.

Training, experience, and education increase an employee's marginal productivity and should therefore increase wages. The amount of increase in wages depends on the type of training, experience, or education and who bore the cost. An employee that finances and completes their own training or education will likely demand a higher wage that reflects their improved productivity. A company that pays for an employee's

training or education will likely offer a wage lower than the improved productivity to recoup costs.

C. COST OF SPECIFIC TRAINING

A specialized company must invest in firm-specific training to increase its employees' marginal product. The uniqueness of the desired job skills requires that the company provide this training since it is unlikely that the employee can obtain these skills elsewhere. The company must also bear the cost of this training since the instruction has no value to the employee unless they work for the company. For these reasons, companies shoulder the costs of specific training. However, the amount of training and the resulting wage the company pays the employee must be tailored to maximize profits.

Assume a company hires a new employee, in an open labor market, with a marginal product of MP*. The company should offer that employee a wage that is equal to their marginal product (MP* = W*) because the employee could easily be offered that wage at another company. If the company must give the employee specific training to make them more valuable to their firm, then they must bear the cost.

Figure 2.1 illustrates a two-period wage stream associated with specific training. Period 1 is the period in which the new employee would be trained and Period 2 represents the period after training when the employee is working full time at their hired position.

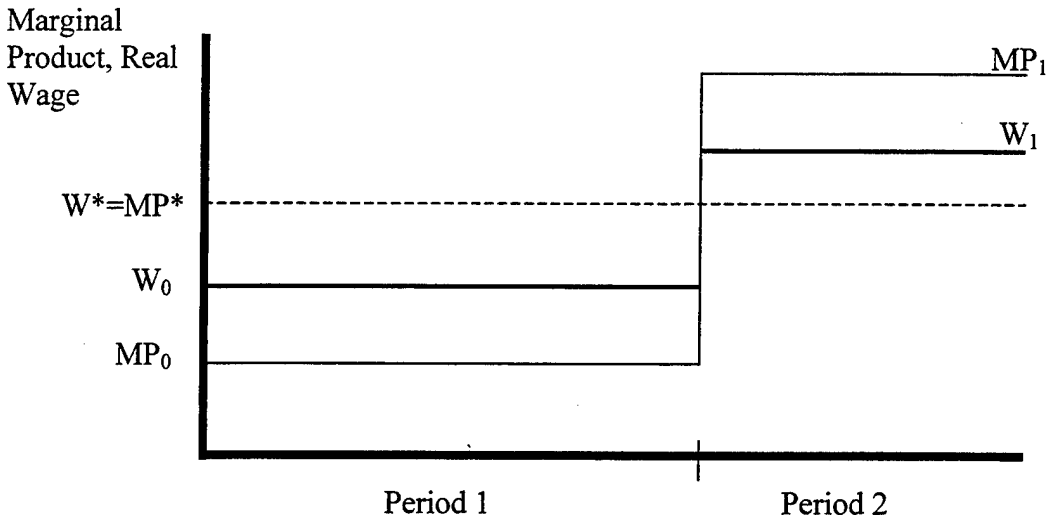

Figure 2.1 A Two Period Wage Stream Associated with Specific Training From Ref. [1, p. 161]

As stated above, the new employee's initial worth to the company is MP*. MP* represents the general skills that the employee has obtained through school, training, or experience. These skills, such as computer literacy, are valuable to any firm in a given industry. The value of these skills determines the wage offered to the employee in an open market. This wage (W*) is equal to the employee's general skills (MP*).

The hiring firm is highly specialized and wishes to specifically train the new employee for length of Period 1. While in training, the new employee's actual marginal product falls to MP_0. This is the result of time spent in training instead of producing for the company. At the completion of training (Period 2), the new employee has mastered new skills which increases marginal productivity to MP_1. This increase in marginal productivity is only relevant at the current firm since the specific training did not increase

what the open market considers the new employee's marginal productivity. The market would not be willing to pay a higher wage for it. [Ref. 1, p. 161]

The hiring firm is reluctant to pay wage W* during Period 1. The reduced productivity (MP_0) of the new employee during Period 1 creates a cost to the company of the difference between W* and MP_0 for the entire length of Period 1 [(W* - MP_0)*Period 1]. This cost, coupled with the actual cost of the training constitutes the total expense to the company. Offering a wage equal to MP_0 would discourage new employees from joining the company because they are much more valuable to other firms. The company must set a wage that is attractive to new employees and allows the company to recoup training costs while ensuring profit maximization. Employees are willing to receive lower wages than their marginal productivity now, if they perceive that future pay raises compensate for present wages and the company is willing to pay a higher wage after training (W_1) if the wage allows for the total training costs to be recouped.

To recoup training costs and ensure profit maximization the company must decide on the stream of wages that they will offer the new employee. These wages will have to adhere to the following equations that account for the present value of both wages and marginal productivity. The equations are

$$MP_0 + \frac{MP_1}{(1+r)} = W_0 + Z + \frac{W_1}{(1+r)} \tag{2.1}$$

$$W_0 + \frac{W_1}{(1+r)} = W^* + \frac{W^*}{(1+r)} \tag{2.2}$$

where r is the market interest rate, Z is the cost of training, MP_0 is the marginal productivity during training, MP_1 is the marginal productivity after training, W_0 is the initial wage offered by the company, W_1 is the wage offered by the company in the

second period, and W* is the wage the market would pay the employee.[Ref. 1, p.156, 158, 161]

Equation 2.1 states that the sum of the marginal productivity during training (MP_0) and the increased marginal productivity after training (MP_1), when discounted to present values, must equal the sum of the initial wage offered and the cost of training, plus the wage offered in Period 2 when discounted to present values. This equation proposes that the total cost of the specific training to the company must be equal to the total benefit it will receive in increased productivity.

Equation 2.2 states that the initial wage offered (W_0) plus the discounted value of the wage offered in Period 2 (W_1) must be greater than or equal to the wage offered by the market (W*) plus its discounted value for the second period. This equation must be satisfied for the employee to agree to be hired and trained. If the stream of wages offered by the hiring company had a lower present value than the stream of wages offered in the market, the employee would logically choose the market job, all other things being equal.

Once the hiring company has established a wage stream that covers its costs for specific training, it must safeguard against the new employee leaving before the total cost of training can be recouped. The company would not be able to recoup all of the training costs invested in the new employee if the new employee quits after Period 1. The company must therefore either contract the new employee for the length of time needed to recover costs, or offer a high enough wage after training (W_1) to entice the employee to stay for the required length of time. [Ref. 1, p. 161]

D. NAVY'S FIRM-SPECIFIC TRAINING

The United States Navy engages in firm specific training. The uniqueness of the services that the Navy provides to the country guarantees the need for specific training. The Navy's mission is to maintain, train and equip combat-ready forces capable of winning wars, deterring aggression, and maintaining freedom of the seas. It accomplishes this mission with specialized equipment including warships.

The crew of these warships is specifically trained how to operate the machinery and weapons onboard. Some of the skills and knowledge needed to operate ships efficiently and effectively is general knowledge that can be learned in civilian institutions, such as state maritime academies which teach basic seamanship and engineering skills. Warfare skills, however, are unique to the Navy and are not taught in civilian institutions. This is the specific training that the Navy offers.

This thesis will study the specific training the Navy gives to Surface Warfare Officers. An officer that meets the eligibility criteria and then qualifies in accordance with OPNAV INSTRUCTION 1412.2G is designated as a Surface Warfare Officer. The training provided by the Navy to the eligible officers is firm-specific training because it is geared toward operating warships. Many types of officers are eligible to become a SWO, but this thesis will only consider newly commissioned Ensigns with a 116X designator, whose primary responsibility is to obtain the SWO qualification. The term "junior SWO" in this thesis refers to 116X designated officers.

E. TRAINING PERIOD

After commissioning, an officer with a 116X designation (junior SWO) begins training for the SWO qualification. This training consists of both formal school and

shipboard training. OPNAV INSTRUCTION 1412.2G allows 116X officers 18 months to attain a SWO qualification once they have reported onboard their first ship. This 18 months, coupled with transit time to duty stations and required school training, establishes a training period for 116X officers ranging between 24 and 36 months. For the purposes of this thesis, the training period will be defined as the 24 months between commissioning and obtaining the SWO qualification, as most SWOs complete their qualification in this period.

III. COMET MODEL

A. OVERVIEW

The COMET model is the culmination of a five-year project undertaken by the Naval Center for Cost Analysis (NCCA) and the SAG Corporation. The SAG Corporation, a social science research company, created the COMET model to provide software that would estimate the total, marginal and average costs of filling the Navy's active, reserve, and civilian positions. The system includes a series of econometric and operations research simulation models that can be used to explore the effects of personnel policy on manpower costs. Users of the COMET model can simulate trade-offs between hardware and manpower for accurate cost/benefit analysis.

The COMET model provides granularity of personnel costs by paygrade, officer community, and enlisted specialty. It includes all items funded by Military Personnel, Navy (MPN) accounts, such as pay and allowances, retirement accrual, FICA contribution, and PCS costs. COMET includes variable indirect personnel costs that are funded through a mix of MPN and Operation and Maintenance, Navy (O&MN) accounts, such as training and base operational support. It also addresses some costs not funded by the Navy, such as CHAMPUS (funded by Office of the Secretary of Defense) and some items funded outside of the Department of Defense, such as GI Bill benefits (funded by the Veterans Administration). [Ref. 2]

The COMET model is a relatively new costing tool for the Navy. It deals exclusively with the marginal costs of personnel. Marginal costs are useful for hardware versus manpower studies, but do not elucidate the investment in an individual. Investments in an individual are important when considering wage or retention issues.

This chapter will review the COMET model and its ability to capture SWO training costs. This discussion will also provide insight to the Navy's costing techniques and introduce the structure of the methodology used in this thesis.

B. BACKGROUND

The COMET model is based on research by Dr. Henry L. Eskew. Dr. Eskew wrote a series of papers that defined the methodology used in his Cost of a Sailor (COAS) study. These papers outlined a method to capture variable indirect personnel costs associated with operational billets in the fleet. Dr. Eskew used statistical time-series regression to prove a relationship between support personnel and the number of operational billets in the fleet.

Dr. Eskew's historical data consisted of Program Elements (PE) from the Future Years Defense Program (FYDP). In his work entitled, "The Response of Aviation Training Costs to Changes in the Requirement for Aviators", Dr Eskew estimated the change in the cost of training support activities that resulted from varying the number of pilots in the fleet. The report's final estimate established a $72,000 change in annual training costs for an increase of one operational aviator. The MPN component of that figure is $40,000 while the other $32,000 is O&MN funding. This $72,000 represents the marginal cost of one additional aviator, not the total cost to train an individual pilot. [Ref. 3, p. 2]

FYDP data could not support regressions to establish the marginal costs of officers in other principal communities (Surface Warfare and Submarine). Funding for post-commissioning training for these officers is not contained in separate PEs, so Dr.

Eskew based the variable indirect cost of training SWOs and submariners on the training costs for aviators.

C. COMET'S COSTS FOR SWO

The one common aspect of training aviators, SWOs, and submariners is time spent in a classroom. Officers in each community must complete formal schoolhouse training as part of their qualification process. Dr. Eskew used this commonality to develop a costing technique for SWOs and submariners. He removed the flight hour training costs for aviators and proportioned the remaining costs based on time spent in a classroom. He then applied these cost proportions to the training pipeline for SWOs and submariners. For example, if a SWO spends 22 weeks in a classroom and an aviator spends 66 weeks in class, then the training costs for SWOs are estimated to be one-third of the costs for aviators. [Ref. 4]

These training cost estimates for SWOs and submariners are admittedly weak, and more research on the subject is needed. NCCA recognizes this and is in the process of identifying more appropriate costing methods. Several dissimilarities in the training pipelines of SWOs and aviators aggravate the problem.

D. WARFARE TRAINING PIPELINES

The fundamental difference between SWO/submariner and aviator training pipelines is that aviators earn their wings (or flight officer designation) when they complete formal schoolhouse training. Aviation schools include "stick hours" or flight time in actual airplanes. This "stick time" constitutes the practical portion of the pilot's training. So pilots are trained, qualified, and warfare designated at the completion of these schools. SWOs and submariners, however, must complete both formal schoolhouse

training and Professional Qualification Standards (PQS) onboard their first ship before earning their warfare designation. SWO/submariner training pipelines have very little practical training. The variety of platforms on which SWO/submariners serve inhibits practical training as the cost of separate trainers for each platform would be enormous.

Neither pilots nor SWO/submariners are fully qualified when they report to their first operational duty station, but pilots are warfare designated and become fully productive in a few weeks versus the 18 months it would take a SWO/submariner. Although this disparity seems large, officers in each of these communities finish their respective qualifications at roughly the same length of service, about 2 years. SWO/submariners finish formal schoolhouse training enroute to their first duty assignment and then begin practical training, while the aviator pipeline combines the schoolhouse with the practical training.

E. SPECIFIC TRAINING PIPELINE FOR SWO

Officers who are commissioned with a 116X designation report immediately to Surface Warfare Officers School (SWOS) in Newport, Rhode Island. The Navy incurs a PCS cost to move this officer and any dependents from the commissioning place to SWOS. While at SWOS, Ensigns complete Surface Warfare Officer School Division Officer Course (SWOSDOC). SWOSDOC includes eleven weeks of Operation and Combat Systems fundamentals (PHASE I), six weeks of platform specific engineering training (PHASE II), and three to six weeks of billet specialty training (BST). Additional training courses may be required for specific billets and ship types. After all required training schools have been completed, the Ensign again executes a PCS to the homeport of their first ship. Upon reporting aboard their first ship, the Ensign begins qualifying as

a SWO and must be fully qualified in 18 months. For the purpose of this thesis the training pipeline will be defined as the 24 months after commissioning.

E. APPLICABILITY OF THE COMET MODEL

The limitations of the COMET model in accurately capturing the training cost of junior SWOs preclude its use in this thesis. The COMET model focuses on the marginal cost of a specific type of officer. While this information is useful in hardware/manpower analysis, the COMET model cannot answer the primary research question of this thesis. To answer the question, "How much does it cost the Navy to produce a SWO?" individual-training costs per billet and ship type must be captured.

The challenge of accurately capturing SWO training costs lies in capturing the varied requirements for first tour assignments. Billet and type of ship determine specific Basic Skills Training (BST) that an 116X officer must complete prior to arriving at the ship. The length and cost of these courses can vary widely. While this fact precludes aggregate cost analysis derived to explain the costs of an individual, the reverse is possible. The thesis utilizes the costs of training individual 116X officers and aggregates them to develop a weighted average cost of SWO training.

This thesis uses data from the DoD Military Composite Standard Pay and Reimbursement Rates, reports from the Naval Education and Training Professional Development and Technology Center (NETPDTC), and BST requirements from SWO detailers at Navy Personnel Command (NPC) to identify training costs.

IV. METHODOLOGY AND RESULTS

A. OVERVIEW

This thesis defines the training pipeline for 116X designated officers as the 24 months between commissioning and SWO qualification. This chapter will describe the methodology and results of assigning costs to this pipeline. The following equation describes the training pipeline for SWOs and will aid in explaining costs.

(4.1) SWO = PCS + BST + PCS + SHIPBOARD TRAINING

Where PCS is the cost of a Permanent Change of Station, BST is the weighted average cost of Basic Skills. This equation will provide the weighted average cost of training a qualified SWO. Cost estimates include direct and indirect MPN and O&MN costs where applicable, but do not include other costs not funded by the Navy, such as CHAMPUS. Recruitment and college/scholarship costs are also not addressed. These costs should be considered acquisition costs to the Navy, not training costs. All costs for this thesis will be in 1998 dollars. Changes to pay that took affect in 1999, such as Basic Allowance for Housing, will not be included.

The remaining sections of this chapter will describe the methodology used to capture the variables in the Equation 4.1. The results are also presented and used to update Equation 4.1 at the end of each section.

B. PCS COSTS

A Midshipman who completes education and initial training at the United States Naval Academy (USNA), the Naval Reserve Officer Training Corps (NROTC), or Officer Candidate School (OCS) is commissioned at the training site upon graduation.

These new officers are then assigned to their next duty station. USNA and ROTC graduates are transferred to their next assignment, OCS graduates remain at their training site (Newport, RI). The Navy considers this transfer the first Permanent Change of Station. For 116X officers, the duty station is Surface Warfare Officer School Command in Newport, Rhode Island. The Navy pays for all moving and travel expenses (within limits) for the Ensign and their dependents, including spouse and children. Typically, newly commissioned officers have no dependents. Travel expenses include a mileage reimbursement for privately owned vehicles driven to the next duty station and a daily allotment, called a Per Diem, for lodging and food. Moving expenses include the cost for a commercial carrier to move household goods from one duty station to another. There are limits and restrictions on the amount of house-hold goods that an officer may ship, however, for the most part, all moving expenses are covered.

While executing PCS orders, an officer receives full pay and allowances and accrues retirement and leave credits. Allowances include a Basic Allowance for Quarters (BAQ) and a Basic Allowance for Subsistence (BAS).

To account for all these costs, this thesis will use the Military Composite Standard Pay and Reimbursement Rates, Department of the Navy, for Fiscal Year 1998. These rates are determined by the DoD and provide average rates by paygrade for officers and enlisted personnel. The rates can be used for budgeting, recovering costs from non-Defense agencies, and for cost estimation. The rates include all items funded by MPN, including pay and allowances, special pay, PCS, and government share of FICA and retirement accrual. The rates also include a six percent acceleration factor for Officers,

which covers indirect personnel costs, such as the pay of administrative personnel that service an officer's records. [Ref. 5, Appendix I, p. 6-I-2]

Appendix A contains the Composite Standard Pay and Reimbursement Rates for the Navy in 1998. The direct cost to the Navy of a PCS move is reflected in Column 6 of the composite rate, the indirect costs would be covered by the acceleration factor. The total cost of a PCS move may be obtained by computing a Daily Rate. The daily rate is calculated by following the instructions of Note (2) from the composite rate table, which stipulates multiplying the amount billable to non-DoD Entities (Column 10) by a factor of .00439. Multiplying the Daily Rate times the normal 30 days allotted for a PCS move yields $6889 per PCS, when rounded. This figure can then be inserted into the cost of training a SWO, Equation 4.1.

$$SWO = \$6889 + BST + \$6889 + SHIPBOARD\ TRAINING$$

C. BST COSTS

In order to compute BST costs, this thesis will use the "Direct Cost Per Grad Cost Analysis Report" promulgated by Naval Education and Training Professional Development and Technology Center (NETPDTC). This report contains direct and indirect costs of all training courses offered by the Naval Education and Training Command. This includes SWOSDOC and most of the BSTs required by the billets and ship types representing a junior SWO's first assignment. The AEGIS Training and Readiness Center (ATRC) provided cost reports for required AEGIS schools. The few remaining courses for which no hard cost reports could be found were estimated at the rate of $1600 per week, which represents the average cost for courses similar both in content and length. The remaining courses include Communication Security Material

System Custodian and Information System Officer, which are common to every platform. Since both courses are common to almost every platform, no bias toward ship class exists from the estimated costs.

The "Direct Cost Per Grad Cost Analysis Report" and cost estimates from ATRC include MPN, O&MN, and student pay and allowances. These costs capture both direct and indirect costs for training but do not account for retirement accrual, FICA contribution or health care. Therefore, the actual cost to the Navy for schoolhouse training is probably higher than estimated by these reports, however these reports are still used for simplicity.

The "Direct Cost Per Grad Cost Analysis Report" reflects the average cost to train one equivalent graduate, taking attrition into consideration. The number of equivalent graduates is computed by converting total course work units to training man weeks. The man weeks of students that attrite are then subtracted from the total man weeks. The result, when divided by curriculum length, gives you the number of equivalent graduates. This formula distributes the costs of students who attrite to graduates of the course. Including attrition costs is important, because it is a training school cost and ultimately an expense to the Navy. The total cost per equivalent graduate is used in this thesis as the cost of the designated training course. All costs are reported in 1998 dollars.

Training course requirements are established by billet and ship type. Detailers from Navy Personnel Command (NPC) provided a spreadsheet of required BSTs for each billet and ship type in the Navy. Costs for a billet's required training courses were summed to obtain total schoolhouse training costs for each billet. The training costs for billets ranged from $17,941 for a Ship Electronic Warfare Officer on several platforms to

$66,536 for a Damage Control Assistant on a Mine Countermeasures (MCM) ship. Training costs for all 116X officers on a given platform were averaged to obtain an average training cost per ship type. The results are listed in Table 4.1.

Ship Type	Average Per Ship	Ship Type	Average Per Ship
MCM	$ 66,536	AGF	$ 29,546
MHC-51	$ 44,588	DDG-993	$ 28,655
DDG-51	$ 38,146	FFG-7	$ 28,410
CG-65-73	$ 37,700	LSD-41	$ 28,317
CG-47-64	$ 35,423	LST	$ 26,735
AE	$ 33,515	LCC	$ 26,551
AO-177	$ 33,027	AOE-1	$ 26,326
LPD	$ 32,254	MCS	$ 25,981
DD-963	$ 31,983	AOE-6	$ 25,833
LHD-1	$ 31,820	LSD-36	$ 25,821
LHA	$ 31,814		

Table 4.1 Average BST Training Cost by Ship Type for Junior SWOs

The relatively high average training cost for MCM and MHC-51 ships reflects the small number of officers assigned to those ships and their complex mission. Small wardrooms create an overlap of responsibilities for traditional billets found on surface vessels. The 116X officer billeted as First Lieutenant Afloat on an MCH-51 attends five weeks of Supply Indoctrination for Line Officers, which adds an $8,000 expense. Mine Warfare specialty schools also add $17,541 to the total billet cost. Damage Control Assistant (DCA) is the only 116X billet on an MCM. On every platform, the DCA billet had the highest BST training costs. BST training involves engineering schools and a separate DCA school, both of which are expensive. These engineering and damage control costs, coupled with mine warfare schools, account for most of the $66,536 in training a DCA receives prior to going to an MCM.

AEGIS ships had the highest average costs of the Cruiser/Destroyer community. AEGIS ships' costs averaged about $7,800 more than the rest of the Cruiser/Destroyer community. All 116X officers on AEGIS ships are required to complete AEGIS Console Operator School, which costs $8668 per officer. Excluding these costs would place AEGIS ships squarely in the middle of the list. The remaining ship types do not sort into any specific groups for comparison purposes.

Factoring in the number of ships in the fleet and calculating a total training cost for each ship class is shown in Table 4.2.

Ship Type	Average Per Ship	# of Ships	Total for Class
MCM	$ 66,536	14	$ 931,504
MHC-51	$ 44,588	11	$ 490,468
DDG-51	$ 38,146	24	$ 915,504
CG-65-73	$ 37,700	9	$ 339,300
CG-47-64	$ 35,423	18	$ 637,614
AE	$ 33,515	4	$ 134,060
AO-177	$ 33,027	4	$ 132,108
LPD	$ 32,254	11	$ 354,794
DD-963	$ 31,983	26	$ 831,558
LHD-1	$ 31,820	6	$ 190,920
LHA	$ 31,814	5	$ 159,070
AGF	$ 29,546	2	$ 59,092
DDG-993	$ 28,655	1	$ 28,655
FFG-7	$ 28,410	38	$ 1,079,580
LSD-41	$ 28,317	12	$ 339,804
LST	$ 26,735	2	$ 53,470
LCC	$ 26,551	2	$ 53,102
AOE-1	$ 26,326	4	$ 105,304
MCS	$ 25,981	1	$ 25,981
AOE-6	$ 25,833	4	$ 103,332
LSD-36	$ 25,821	4	$ 103,284
	Totals	202	$ 7,068,504
	Wieghted Average		$ 34,993

Table 4.2 Weighted Average Training Cost

Table 4.2 illustrates the sum of the totals for each class divided by total number of ships in the fleet (with 116X billets). This is the weighted average training cost of an 116X officer. That total is $34,993. This number can then be entered into Equation 4.1 below.

$$SWO = \$6{,}889 + \$34{,}993 + \$6889 + SHIPBOARD\ TRAINING$$

D. SHIPBOARD TRAINING

Determining a method to capture the training costs of an officer onboard a ship is difficult. Once aboard, a 116X officer has two jobs, qualifying for SWO and running an assigned division. Officer performance is evaluated for both jobs, but not separately. If an officer's salary were separated into division officer pay and pay for training or if their time was clearly divided by jobs, determining a shipboard training cost would be simple. Unfortunately, this is not the case so another method must be developed.

Division officer duties and responsibilities and SWO qualification standards overlap. The SWO qualification instruction requires an officer to demonstrate effective leadership skills and proficiency in performing division officer duties prior to qualification. [Ref. 6, para 5.h] An argument could be made that all work performed by a division officer is related to the SWO qualification, therefore all pay should be considered a training cost. This argument is extreme, however. Clearly some of the officer's productivity contributes to ship's operation and should not be counted as a training expense.

The MPN costs for training a SWO onboard would include a direct cost, a portion of the 116X officer's pay, and an indirect cost. The indirect cost would include other SWO qualified officers' and enlisted pay for time spent instructing new 116X Ensigns, as

well as the cost of administration for paperwork. Determining these costs would be complex and perhaps unjustified as part of the senior SWO officers' duties and responsibilities on a ship is to train junior officers. Additionally, even when everyone is fully qualified, much of the time spent onboard ship is spent training together to form an effective watch team. While on watch, training junior SWOs is secondary to the duty of ensuring the safe operation of the ship. Therefore, the amount of a senior SWO's time spent training a perspective SWO is considered a small opportunity cost to the ship and to the senior SWO and not an indirect training cost of an 116X.

The O&MN cost of training a SWO also may not apply onboard a ship. O&MN costs include supplies and materials required for training, however spare parts and fuel costs to operate the ship can not be directly applied to training perspective SWOs. When a ship gets underway, a majority of the crew receives some training. This training could support various qualifications or naval proficiency, not just SWO training. Even if all officers were SWO qualified, the ship would still get underway. Thus, for the purpose of this thesis, all O&MN ship costs will be considered a direct cost of fleet operations, vice a personnel cost.

Shipboard training costs will be limited to the percentage of the perspective SWO's pay earned while training. The specific proportion of pay will be tied to the officer's productivity. For the purpose of this thesis, an 116X officer on watch is considered to be actively training and therefore to have no productivity. All of his pay during watchstanding is a training cost. An 116X officer performing duties other than standing watch will be considered productive and that portion of pay will not be counted as a training cost.

1. Length of Training

The SWO qualification instruction allows 116X officers 18 months onboard their first ship to complete their SWO qualification. The SWO qualification includes several watchstation qualifications, such as Officer of the Deck Inport, Combat Information Center Watch Officer, SWO Engineering, and Officer of the Deck (underway). An officer must demonstrate proficiency in both the theoretical aspects and practical skills for each watchstation to be fully qualified. It is an arduous process that begins as soon as the Ensign checks aboard; it culminates in an oral board chaired by the Commanding Officer. [Ref. 6]

This thesis assumes that all watches stood by an 116X officer provide the experience and skills necessary to qualify as a SWO. This includes both underway and inport watches. The watchstation progression in the SWO qualification can be considered a progression of responsibility. From Officer of the Deck Inport to Officer of the Deck (underway), the responsibilities of the watchstation increase. Standing a lower watchstation builds the experience needed at a higher position.

All watches stood in the 18-month period allotted to SWO qualification are therefore hours of training and are included in the training cost of a SWO.

2. Operational Tempo

Operational tempo (OPTEMPO) is the average amount of time a ship is at sea away from its homeport. This includes deployments, exercises, and general training. This thesis will use current OPTEMPO goals of 50.5 underway days per quarter for deployed forces and 28 underway days per quarter for non-deployed ships. OPTEMPO goals are established by the Chief of Naval Operations (CNO). [Ref. 7, ch.2 p. 4]

The 18-month period allotted to SWO qualification mimics a typical training cycle for ships. This cycle consists of 12 months of operational training and inspections and a 6-month deployment overseas. Converting months to quarters, the defined SWO training period will include 2 deployed quarters and 4 non-deployed quarters.

With regards to OPTEMPO, the 2 deployed quarters consist of 101 days underway (14.43 weeks) and 79 days inport (11.57 weeks). The 4 non-deployed quarters break down to 112 days underway (16 weeks) and 254 days (36 weeks) inport. The number of weeks underway and inport are essential to shipboard training cost calculations and will be explained below.

3. Navy Standard Workweeks

Navy standard workweeks are defined in Appendix C of the Manual of Navy Total Force Manpower Policies and Procedures (OPNAVINST 1000.16J). Standard workweeks are an important component in determining manpower requirements and personnel utilization. These guidelines are for sustained personnel utilization under projected wartime or peacetime conditions. They are not intended to define personnel endurance, nor are they intended to mandate working hours. [Ref. 8, p. C-1]

The Navy Standard workweeks are the building blocks of unit manning. They are used in conjunction with other requirements, such as preventive maintenance and corrective maintenance, to document the number of personnel needed to operate a ship or shore installation. The Total Force Manual is used extensively in development of both officer and enlisted requirements.

The afloat standard workweek assumes a unit steaming in Condition III (wartime/deployed cruising readiness) in a three-section watch basis. It allows for a

productive workweek consisting of 56 hours of watch and 11 hours of other work. It also permits 7 hours for general drills and 7 hours for service diversions, such as morning quarters. [Ref. 8, p. C-3] Only the hours appropriated to watch standing will be used in the thesis.

OPNAVINST 1000.16J does not define the standard workweek of shipboard personnel inport. However, the workweek for Military Personnel Ashore defines working hours that resemble the inport workweek. This workweek allows for 40 hours of work and will be used for both homeport and overseas inport time. [Ref. 8, p. C-5]

Duty is added workload necessary to operate the ship 24 hours a day. However, the Military Personnel Ashore workweek does not include these duty hours which shipboard personnel are required to stand inport. Watchstanders are required to operate the ship 24 hours a day. Thus duty hours must be accounted for in this model and are important because they determine the hours spent on watch while inport.

The author contacted Navy Manpower Analysis Center (NAVMAC) to determine hours spent inport in a watchstanding status. NAVMAC acknowledged that duty was stood every six days per Type Commander instructions and estimated 10 hours as the average spent on watch per week in a homeport. [Ref. 9] While inport overseas, duty is stood every three days and the average time spent on watch is 20 hours. The author's personal experience supports this figure.

4. Calculation of Shipboard Training Costs

This thesis defines shipboard training costs as the expense of an 116X officer standing watch during the 18-month training period aboard ship. Therefore, the

shipboard training costs would equal the portion of annual pay earned while standing watch.

Annual working hours were determined using the Navy Standard Workweek and OPTEMPO data. The calculations for total watch hours stood during the SWO training period are presented in Table 4.3.

	# of Weeks	Hrs of Watch/Week	Total Hours
Deployed			
Underway	14.43	56	808
Inport	11.57	20	231
Non-deployed			
Underway	16	56	896
Inport	36	10	360
		Total Hrs Watch	2,295

Table 4.3 Total Hours of Watch Stood During 18-Month Training Period

The calculations for total non-watch working hours calculated in Table 4.4.

	# of Weeks	Hrs of Admin/Week	Total Hours
Deployed			
Underway	14.43	11	159
Inport	11.57	40	463
Non-deployed			
Underway	16	11	176
Inport	36	40	1,440
		Total Hrs Admin	2,238

Table 4.4 Total Hours of Other Work During the 18-Month Training Period

Thus, the total hours worked during the 18-month training period is 4,533 hours. Dividing the 2,295 watch hours by this total yields 50.6%. Therefore, 50.6% of an 116X officer's working hours are spent on watch.

The Military Composite Standard Pay and Reimbursement Rates table lists an Ensign's real wage, including basic pay, retirement accrual, housing allowances, subsistence allowance, and incentive/special pays, as $41,369 (Columns 1 thru 5). Multiplying an Ensign's real wage times 1.5, for the 18-month period, and 50.6%, for watch hours, yields $31,423. This is the shipboard training cost for an 116X officer and can be entered into the cost of a SWO equation (4.1) below.

(4.1) SWO = $6889 + $34,993 + $6889 + $31,423

Thus, this thesis estimates the total training cost for qualifying a Surface Warfare Officer to be $80,194.

E. SUMMARY

The total training cost for qualifying a SWO is $80,194, as determined by this thesis. This figure is based on the assumption that all watches stood underway and inport are for training, the Military Composite Standard Pay and Reimbursement Rates accurately reflect MPN costs for 116X Ensigns, the Navy Standard Workweeks honestly represent the working hours for division officers, and the methodology presented is correct.

V. CONCLUSIONS AND RECOMMENDATIONS

A. FIRM-SPECIFIC TRAINING

The type of instruction received by 116X officers while completing the SWO training pipeline is mostly specific training; the knowledge and skills acquired by these officers directly increases their productivity for the Navy. When these officers are commissioned, they are college graduates with some general knowledge of the Navy, such as types of weapons, fleet assets, code of conduct, basic leadership skills, and how to wear a uniform. When they earn a SWO pin and are designated as Surface Warfare Officers, they are knowledgeable and proficient in fleet tactics, shipboard administration, and how to operate a ship at sea. As such, these qualified SWOs are considered to have increased their productivity for the Navy; this thesis estimated that the Navy has paid $80,194 on average for this change.

In this thesis, Figure 2.1 illustrated a classic two-period wage stream associated with specific training. The graph showed marginal productivity and wages before and after training. Chapter II also defined certain equations that must be satisfied for a company to recoup the expense of specific training. One of the secondary research questions of this thesis is to determine if the Navy adheres to the economic theory of firm-specific training with regards to training costs, wages, and incentives for SWOs. Figure 5.1 is a graph of the author's interpretation of the Navy's four-year wage stream associated with training an 116X officer as estimated by this thesis.

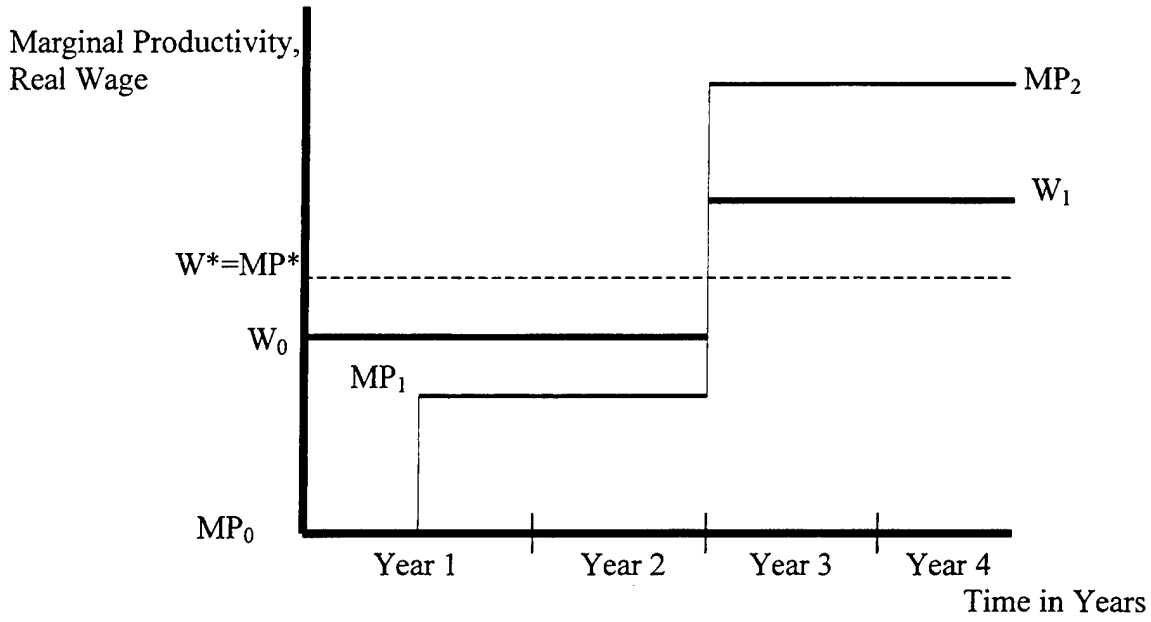

Figure 5.1 SWO's Four Year Wage Stream Associated with Specific Training

In Figure 5.1, the y-axis is the officer's marginal productivity and real wage. Real wages include all pay and allowances as well as benefits. The x-axis is a measure of time in years. The first two years is the time period this thesis has defined as the training pipeline for 116X officers. The next two years is the remaining time until an officer satisfies his minimum service requirement (MSR). The four-year MSR applies to Naval Reserve Officer Training Corp (NROTC) scholarship officers and lies between the MSR of Officer Candidate School (OCS) officers (3 years) and United States Naval Academy (USNA) graduates (5 years).

All 116X officers must be college graduates, so MP* is the initial marginal productivity of a college graduate, and W* is the wage they would be offered in the

civilian labor market. W* would represent an average of offered wages since there is wide variety of college majors among 116X officers; each would receive different initial wages. Job tenure over a span of years typically raises marginal productivity and wages, however, MP* and W* will remain constant for simplicity.

During the schoolhouse portion of training (6 months), an 116X officer's marginal productivity is zero as the officer produces no work for the Navy. He does not administrate, operate machinery, or lead sailors. He is purely in a training status and his marginal productivity (MP_0) reflects this. His marginal productivity jumps to MP_1 when he checks aboard his first ship. There he is actively engaged in his duties and responsibilities as a division officer. As the research on shipboard training costs has shown, over half of his time is spent on watch in a training capacity, so his marginal productivity is below MP*. He would have to be working full time on assigned non-watchstanding duties for marginal productivity to reach MP*.

At the end of the training period (beginning of year 3), the officer qualifies as a SWO. This vaults his marginal productivity to MP_2, well above MP*. The increased level of MP_2 reflects the greater work output of a SWO. A SWO stands unsupervised watches, effectively leads divisions, and trains junior personnel. A SWO's marginal productivity may increase even more during the third or fourth year of service, after obtaining qualifications such as Engineering Officer of the Watch, Command Duty Officer, and even Tactical Action Officer. These increases are difficult to quantify and vary greatly; there are no defined training periods for these qualifications. For simplicity these qualifications and their influence on productivity will be omitted from this thesis.

W_0 is the initial real wage paid to Ensigns in the Navy. The Military Composite Standard Pay Rates lists Ensign pay as $41,369 (sum of columns 1-5) (in Appendix A; Columns 6-10 are additional expenses to the Navy and do not apply to real wage calculations). This amount does not include dependent health care costs. Incentive and special pays are included, however typical 116X officers receive little if any. Intuitively, W_0 should be lower than W* because the Navy has to recoup recruitment and college scholarship costs during the officer's MSR.

W_1 is the real wage officers receive at the two-year point of their service. The pay raise is not the result of qualifying for SWO, it reflects the promotion to Lieutenant Junior Grade (O-2). Officers with satisfactory performance are promoted to O-2 regardless of qualifications. The Military Composite Standard Pay Rate for an O-2 is $53,585, excluding dependent health care.

Chapter II explained two specific training equations, 2.1 and 2.2, that must be satisfied to recoup of training costs and maximize profits. These equations account for the present value of both wages and marginal productivity. Updating these equations to reflect the more intricate graph of the Navy's four-year wage stream for training an 116X officer (Figure 5.1), the equations become

$$\frac{1}{2}MP0+\frac{1}{2}MP1+\frac{MP1}{(1+r)}+\frac{MP2}{(1+r)^2}+\frac{MP2}{(1+r)^3}=W0+\frac{W0}{(1+r)}+Z+\frac{W1}{(1+r)^2}+\frac{W1}{(1+r)^3}$$

$$W0+\frac{W0}{(1+r)}+\frac{W1}{(1+r)^2}+\frac{W1}{(1+r)^3}=W^*+\sum_{n=1}^{3}\frac{W^*}{(1+r)^n}$$

where r is the real discount rate[1], and Z is the cost of training. The equations represent the present values of the wage stream and marginal productivity for four years. Inflation is assumed to be zero and annual Navy pay raises are omitted.

Substituting values into the Equation 5.1 garners

$$.5(0)+.5(\$20{,}949)+\frac{\$20{,}949}{1.026}+\frac{MP2}{(1.026)^2}+\frac{MP2}{(1.026)^3}=\$41{,}369+\frac{\$41{,}369}{1.026}+\$80{,}193+\frac{\$53{,}585}{(1.026)^2}+\frac{\$53{,}585}{(1.026)^3}$$

This equation reduces to

$$.95\ MP_2 + .93\ MP_2 = \$231{,}508$$

or

$$MP_2 = \$123{,}143$$

Therefore, the marginal productivity of a qualified Surface Warfare Officer as defined by the present value of a four-year wage stream associated with specific training is $123,143.[2] This is what the Navy must consider as the minimum marginal productivity of a SWO if the Navy is to recoup its training costs over the SWO's four-year MSR. If the Navy makes no attempt to recoup training costs in this period, Equation 5.1 implies that the Navy assumes MP_2 = $80,497. The SWO's marginal productivity after completing Navy specific training is likely somewhere between the two extremes, as the Navy recoups at least a portion of the training cost.

Equation 5.2 cannot be accurately solved without knowing what tenure pay raises the civilian sector would offer. Assuming no civilian wage increase during the four-year

[1] The Office of Management and Budget uses a 2.6% real interest rate for four year calculations.
[2] If the equation was a five-year present value wage stream, the fifth-year wage would include promotion to Lieutenant and MP_2 would equal $105,628. A one-year longer cost recovery period accounts for the lower MP2.

time period would upwardly bias W*. Accurate estimates of these wage increases were not found and this thesis makes no attempt to solve Equation 5.2.

Clearly there is a disparity between W_1, the wage of an O-2, and the estimated range for MP_2, the implied marginal productivity of a SWO. This can be expected because the Navy specifically trains SWOs. However, the value of MP_2 as determined by this thesis is more than twice W_1's value. This calls into question the validity of the Navy's training cost recovery time period. This cost recovery time period is determined by commissioning source and does not consider the cost or the amount of training that a SWO receives, as economic theory would suggest. The truth may be that the Navy either does not realize when it recoups the cost of training a SWO or makes no effort to do so. Of note, the pay structure is established for all services, so the Navy has little control over wages. It could however, impact compensation through incentives and bonuses.

B. RETENTION ISSUES

The other secondary research question asked how policy makers could use the estimated cost of training an 116X officer to increase SWO retention. Intuitively, officers who are satisfied with their job, quality of life, pay, and future prospects in the Navy typically remain in the service. Officers who are dissatisfied with one or more of these aspects tend to leave the Navy.

The Navy is experiencing retention problems in all warfare communities. Specifically, the surface community is having serious difficulties retaining SWO Lieutenants. The Navy is currently retaining only 24 percent of SWO Lieutenants, although it needs to retain 38 percent to fill Department Head billets. The critical level of SWO Lieutenant retention is derived from the number of SWO Department Head (DH)

graduates divided by the initial number of officers in a corresponding year group. These billets must be manned by SWO qualified officers who have completed Division Officer tours. If qualified SWO officers are not available to fill fleet Department Head billets, then DH tours are extended to prevent gapping billets. [Ref. 10]

Any policies, such as an increase in the tour length that contradicts the expectations of a SWO, can have a negative affect on both quality of life and job satisfaction, leading to lower retention of post DH SWOs and a possible corresponding shortage of prospective Executive Officers. If this were to happen, the career path for SWO officers would be disrupted, causing significant manpower issues. Junior SWO retention problems can easily compound and create critical shortages if not controlled. [Ref. 10]

This thesis estimated the training costs of qualifying a SWO. It also produced an implied range of a SWO's marginal productivity depending on whether or not the Navy recoups these training costs. This information could be useful in pay incentives aimed at boosting SWO retention. Pay dissatisfaction is one of the reasons SWO's leave the Navy. Well-researched incentives that conform to economic theory could partially stem the flow of SWOs leaving the Navy.

If the present value equation of the four-year wage stream offered by the Navy (Equation 5.1) assumes that the Navy seeks to recover all training costs during the four-year MSR period, the implied MP_2 = \$123,143. This assumption supports an economic long-term profit maximization goal of marginal costs equaling marginal benefits. The Navy, however, is not a profit seeking organization. The Navy will not be forced out of

business if it does not turn a profit. For this reason, policy planners should be guided but not bound to economic principles.

In an economic view, the estimated $80,194 training cost for a SWO who decides to leave at the MSR point is a sunk cost. An officer has no commitment to stay beyond the MSR point to allow the Navy to further recover these costs. Regardless of whether the Navy has recouped their training costs, they must at least pay the SWO the competitive wage for similar occupations and job risks to retain a SWO. This is an important point and should be understood by Navy policy makers. Any training costs not recouped by the time an officer reaches the MSR are sunk and irrelevant for the wage decision beyond MSR. Sunk costs would also include recruiting and scholarship costs, which were not considered as part of this thesis.

Policy planners must develop wage streams that encourage the desired retention for SWO qualified officers. Currently, there are no special pays for SWOs. Sea Pay is offered based on time spent on a ship vice skills acquired, and is available to any Navy personnel that meet the minimum criteria of time at sea. SWOs who have completed significant specific training should be compensated for their increased value to the Navy. Officers that are not compensated for their efforts are bound to be dissatisfied, according to the economic theory of specific training.

If SWOs do receive significant specific training as this thesis indicates, compensation for qualifying as a SWO could be appropriate. This compensation should be prorated to the increase in the marginal productivity of the officer, allowing the Navy to recoup most of the training costs. Compensation should be increased when an officer qualifies as a SWO. Additional compensation should be offered for each large jump in

productivity caused by additional qualifications (such as EOOW and TAO) or completion of schoolhouse training (Department Head School). Proper compensation for training would boost morale and satisfaction with pay. These bonuses would improve SWO retention. The Navy would recoup much of these bonuses over the additional years a SWO would spend in the service. The costs not recovered would be a supplemental liability borne by taxpayers to ensure appropriately trained Naval force, but may be necessary to fill Department Head billets on ships.

C. CONCLUSIONS

This thesis concludes the following

1. The average training cost of an 116X designated officer who completes the typical Surface Warfare Officer training pipeline and qualifies as a SWO is $80,194.
2. The Navy does not use the economic theory of specific training in consideration of SWO training cost and real wage.
3. The Navy should better understand that officer marginal productivity and training costs may be useful to policy makers when considering monetary SWO bonuses or when changing pay structures.

D. RECOMMENDATIONS

This thesis recommends continued research in the area of SWO training costs and its relationship to specific training. A study of comparable civilian wages during an officer's MSR would be useful. Further research should include costs of additional qualifications such as EOOW and TAO. Research is also needed to establish if recruiting and scholarship costs should be considered as a cost of a SWO. Understanding the

influence of specific training theory on the real wages of SWOs may provide guidance for developing a successful SWO bonus or career continuation pay.

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APPENDIX. MILITARY COMPOSITE STANDARD PAY AND REIMBURSEMENT RATES

This appendix contains the rates used to calculate wages and Permanent Change of Station (PCS) costs. The second note (Note (2)) contains an error. The note should tell the reader to apply factors to Column 10 vice Column 9. This error is the result of a format-change oversight. Rate tables from 1997 and 1999 were compared to verify the error.

MILITARY COMPOSITE STANDARD PAY AND REIMBURSEMENT RATES
DEPARTMENT OF THE NAVY FOR FISCAL YEAR 1998

GRADE	BASIC PAY (1)	RETIRED PAY ACCRUAL (2)	BASIC ALLOWANCE FOR QUARTERS/ VHA (3)	BASIC ALLOWANCE FOR SUBSISTENCE /SIK (4)	INCENTIVE AND SPECIAL PAYS (5)	PERMANENT CHANGE OF STATION (6)	MISCEL-LANEOUS EXPENSE (7)	ANNUAL DoD COMPOSITE RATE (8)	ACCELERATION FACTOR (9)	AMOUNT BILLABLE TO NON-DoD ENTITIES (10)
O-10	$113,615	$34,653	$3,700	$1,853	$3,097	$2,807	$11,207	$170,932	$10,256	$181,188
O-9	109,639	33,451	3,379	1,853	3,646	2,807	9,424	164,199	9,852	174,051
O-8	99,333	30,306	8,221	1,853	3,190	2,807	8,959	154,669	9,280	163,949
O-7	87,600	26,718	7,980	1,853	17,457	2,807	9,157	153,572	9,214	162,786
O-6	73,554	22,434	12,140	1,853	7,495	2,807	7,878	128,161	7,690	135,851
O-5	58,499	17,842	12,589	1,853	6,889	2,807	6,538	107,017	6,421	113,438
O-4	47,635	14,529	11,246	1,853	7,587	2,807	5,699	91,356	5,481	96,837
O-3	39,580	12,072	8,755	1,853	6,596	2,807	6,279	77,942	4,677	82,619
O-2	32,165	9,810	7,213	1,853	2,544	2,807	5,394	61,786	3,707	65,493
O-1	24,280	7,406	6,211	1,853	1,619	2,807	5,170	49,346	2,961	52,307
WO-5	----	----	----	----	----	----	----	----	----	----
WO-4	$47,272	$14,418	$10,513	$1,853	$4,336	$2,807	$8,991	$90,190	$5,411	$95,601
WO-3	38,935	11,875	9,292	1,853	2,835	2,807	5,559	73,156	4,389	77,545
WO-2	33,001	10,065	7,817	1,853	3,898	2,807	5,368	64,809	3,889	68,698
WO-1	----	----	----	----	----	----	----	----	----	----
CADETS	$6,696	----	----	$1,876	$202	$110	$512	$9,396	$1,691	$11,087
E-9	$39,850	$12,114	$9,505	$2,337	$2,150	$1,301	$6,306	$73,563	$13,241	$86,804
E-8	32,431	9,859	8,377	2,337	2,221	1,301	5,526	62,052	11,169	73,221
E-7	27,545	8,374	7,328	2,337	2,257	1,301	5,151	54,293	9,773	64,066
E-6	23,397	7,113	6,219	2,337	2,001	1,301	4,576	46,944	8,450	55,394
E-5	19,160	5,844	5,296	2,337	1,538	1,301	4,181	39,657	7,138	46,795
E-4	15,737	4,800	3,129	2,337	1,170	1,301	3,865	32,339	5,821	38,160
E-3	13,416	4,092	1,868	2,337	207	1,301	3,583	26,804	4,825	31,629
E-2	12,400	3,781	991	2,337	202	1,301	3,403	24,415	4,395	28,810
E-1	10,699	3,263	605	2,337	179	1,301	3,090	21,474	3,865	25,339

Notes: (1) Column 9 includes factors for Other Personnel Support Costs. The applicable percentage is 6 percent for officers and 18 percent for enlisted personnel and covers reimbursement for operating appropriations for quarters, subsistence, medical, and other personnel support.

(2) To compute a Daily Rate that includes 14 percent for Leave and Holiday Pay, a factor of .00439 may be applied to Column 9. For an Hourly Rate, .00055 may be used.

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   555 Dyer Road Code SM/Dg
   Monterey, CA 93943-5103

6. Chief of Naval Operations.....1
   Attn: CDR Wall (N869E)
   2000 Navy Pentagon
   Washington, D.C. 20350-2000